

REMARKS

I. Request to withdraw finality

Amendment filed on August 6, 2005, amended the presently pending claims to a form that was agreed to be allowable in a telephone interview with Examiner Lopez on August 5, 2005, as set out in the Remarks section of the Amendment filed on August 6, 2005. After this agreed amendment, however, Examiner Lopez issued a final rejection that effectively repeated his earlier rejection.

In view of the fact that applicants substantially narrowed the claims to secure an agreed allowance, it is believed improper to create a further final rejection that locks applicant in to the narrowed claims without providing the agreed allowance.

Applicants therefore respectfully request that finality of the office action dated August 19, 2005, be withdrawn and that applicants be allowed to amend the claims freely in response thereto.

II. Rejections based on the Sato reference

All claims have been rejected in the most recent Office Action as obvious based on the single reference of Sato et al. Reconsideration of that rejection is respectfully requested.

Sato teaches a method of making a crucible in which only one electrode pair 51 and 52 is used for heating the crucible wall as it is built up. Sato represents the standard single-electrode pair prior art, the problems of which are discussed in the specification of the present application at, e.g., page 2, lines 10 to 18.

Essentially, the problem of the prior art, e.g., Sato, is that the crucible is formed by melting its inner wall while it rotates. The rate of rotation is governed to some degree by a desired level of centrifugal force created – too much centrifugal force makes the melted surface of the crucible tend to slip undesirably up the wall of the crucible. Accordingly, the rate of rotation is effectively geometrically predetermined.

When a single electrode arrangement is used, it heats the wall of the crucible next to it once every rotation. Because the speed of rotation is basically predetermined, this means that the wall at each point is heated periodically depending on how long the crucible takes to make a complete revolution. Between heatings, the point on the wall cools off for the entire revolution, which may allow the melted surface to cool too much, resulting in a degraded quality of the crucible inner surface.

To overcome this, the prior art has applied a lot of heat at the single electrode, so that the wall does not cool off to too low a temperature in a rotation. This however creates another problem – the increased heat energy tends to vaporize the material of the crucible, causing bubbles.

Sato does address the problem of bubbles in the crucible material. However, rather than providing for a method in which the uneven temperatures in the crucible are avoided, Sato tries to reduce the bubbles by applying a vacuum to the crucible through gas suction paths 1b. See Sato, Fig. 1, see also col. 5, lines 17 to 21. In a sense, Sato treats the symptoms, not the disease. Sato does not discuss or even identify the underlying cause of the bubble problem as uneven heating, nor does Sato suggest any step that might avoid the uneven heating.

The present invention overcomes the problem of Sato by a process in which at least two electrode arrangements are used.

Claim 19 and its dependent claims

Claim 19 as amended recites a process in which an electric arc is created by means of an electrode arrangement so as to heat a wall section of the quartz glass crucible as it is rotated at a rate of rotation, and an additional electric arc heating an additional wall section of the quartz glass crucible is created by means of at least one additional electrode arrangement. The electrode arrangements, and their respective heating zones, are spaced from each other in relation to a periphery of the quartz glass crucible. The electric arcs are created so as to reduce temperature differentials in the wall section as the crucible is rotated relative to temperature differentials in a process employing a single electrode arrangement.

Claim 19 recites an additional electrode arrangement spaced from a first electrode arrangement, not shown in Sato.

Furthermore, claim 19 cannot be said to represent a “mere duplication” of the single electrode of Sato, because claim 19 recites an additional element of the invention not shown or suggested by Sato, i.e., of the separate electric arcs being created so as to reduce temperature differentials in the wall sections of the crucible relative to the temperature differentials encountered in a single electrode arrangement system.

Claims 20, 22 to 31, 37 and new claim 45 depend directly or indirectly from claim 19, and therefore distinguish therewith over Sato and the other cited art.

Claim 38 and its dependent claims

Independent claim 38 as amended recites a process that comprises creating electric arcs by means of a plurality of electrode arrangements each comprising a cathode and one or more anodes, and each heating in a respective heating zone a wall of the quartz glass crucible while it is rotated. The heating zones of the electrode arrangements are spaced from each other in relation to a periphery of the quartz glass crucible, and are evenly distributed about the periphery of the quartz glass crucible.

Claim 38 also cannot be said to express a “mere duplication” of the electrode of Sato. The even spacing of the electrode arrangements around the periphery of the crucible minimizes the cooling time for the wall of the crucible as it passes between the heating zones of the arrangements, because those distances are minimized. Sato teaches only a single electrode arrangement, so it is not possible to argue that it suggests the even spacing of a plurality of electrode arrangements around the periphery.

With respect to claim 41, which recited a similar feature and has been canceled without prejudice, the Examiner has stated in the Office action that arranging both electrodes “at equal distances *from* the periphery of the formed glass crucible” [sic] would be done in Sato to because *not* doing so would result in uneven heating of the formed glass crucible. Office action dated August 9, 2005, page 5, lines 3 to 8. The statement of the Examiner suggests an understanding of the claim language of claim 41 that was not intended, and the claim language added to claim 38 clarifies the meaning as distribution evenly about the crucible periphery. Moreover, this observation of the Examiner is clearly guided by

impermissible hindsight. Sato does not mention uneven heating. Uneven heating is only identified as a problem in the present application.

Claims 39 to 40, 42 and 46 depend from claim 38 and therefore distinguish therewith over the prior art.

New claims added by this amendment

New independent claim 47 and depending claim 48 have been added by this amendment.

Claim 47 recites a process comprising rotating the crucible and supplying SiO₂ particulate material into the crucible while it is being rotated. Electric arcs are created using a plurality of electrode arrangements, wherein each electrode arrangement has a cathode and one or more anodes. Each electrode arrangement heats a wall of the quartz glass crucible in a respective heating zone while said quartz glass crucible is rotated so as to heat the SiO₂ particulate material so as to form a glass surface on said wall. The heating zones of the electrode arrangements are located such that the heating zones are evenly distributed rotatively about the periphery of the quartz glass crucible. The electric arcs are created such that points on the wall are heated at least twice per revolution so as to reduce temperature differences therein.

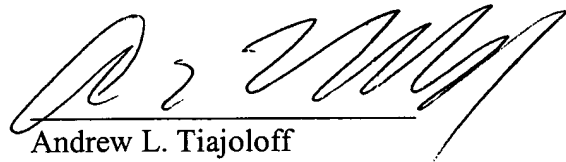
Claim 47 recites additional relationships between the electrodes, and therefore distinguishes over the Sato reference and any mere duplication of parts thereof.

Claim 48 depends from claim 47 and therefore also distinguishes over the prior art.

All claims herein having been shown to distinguish over the prior art in structure function and result, formal allowance is respectfully solicited.

Should any questions arise, the Examiner is invited to telephone attorney for applicants at 212-490-3285.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'A. L. Tiajolloff', is written over a horizontal line.

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